OSHA Standards Applicable to Fire Investigators and Others Who Work at Post-fire Scenes

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The first edition of this paper was published in September 2021. This edition clarifies some of the earlier material and adds related or additional information.

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The text highlighted in red is for added emphasis.

Introduction

In the U.S., the Department of Labor's Occupational Safety and Health Administration (OSHA) standards apply to most private-sector employers and workers, as well as many federal employees (some federal agencies have their occupational standards). However, it does not cover all state and local government workers. All states have the option to participate in the federal Occupational Safety & Health Administration (OSHA) program, implement a separate state program that addresses workplace safety (State Plan), or run a hybrid program of the two (Hybrid Federal-State Plan). Currently, twenty-two states and territories have these state plan programs (see https://www.osha.gov/stateplans for additional information). Seven other states and the USVI have OSHA-approved hybrid programs specifically for state and local government workers only; the federal regulations cover the other workers. This can result in different standards for different workers. See Appendix A for the current list of these plans by state. Additionally, some states may have other occupational safety and health plans or regulations, and these may or may not include state and local government workers. Every employer and worker needs to know the occupational standards that apply to them.

Every attempt has been made here to list the OSHA standards applicable to fire investigators and anyone else working in the post-fire environment, primarily from a detailed examination of part 1910 and other related sections of the OSHA standards. As a strong proponent of wearing adequate and appropriate PPE at most fire scenes, I view these standards as minimum requirements. There are times when higher levels of protection are necessary. As a profession, we are inconsistent in the awareness of the health hazards associated with the post-fire environment. Awareness of and compliance with these standards is a necessary first step in improving fire investigator health and safety. When we know better, we need to do better.

This paper summarizes many of the OSHA standards, also referred to as regulations, that apply to fire investigators and the author's opinion regarding their relevance and application to fire investigators. This material is presented for informational purposes only and does not represent the full content of the referenced standards cited. Readers should review the standards identified herein from the OSHA website to understand their requirements fully. Other standards not listed here could apply in some situations.

OSHA has proposed major changes to the Fire Brigade standard (29 CFR 1910.156) that would be renamed Emergency Response and incorporate many NFPA standards, but not 921 and 1033. A final implementation date, the final language, and its impact on fire investigators is unknown at present.

The Occupational Safety and Health Act of 1970 (OSH Act), which established the Occupational Safety and Health Administration, requires OSHA to promulgate safety standards. These standards are statutory. OSHA's mission is to ensure that employees work in a safe and healthful environment by setting and enforcing standards and providing training, outreach, education, and assistance. The OSHA standards are codified in the U.S. Code of Federal Regulations (CFR).

Covered employers must comply with all applicable OSHA standards. They are enforceable, and violations can result in fines or other penalties. In discussing the OSHA standards, the terms standard and regulation are used interchangeably. According to the OSHA website, "a standard (or regulation) is a regulatory requirement established and published by the agency to serve as criteria for measuring whether employers are following the OSH Act laws." OSHA standards are published in Title 29 of the code and are divided into four parts: general industry, construction, agriculture, and maritime standards. Fire investigators are covered under the general industry part, Section 1910.

Many of the OSHA standards include the term "shall." OSHA clearly defines this word as meaning mandatory; in other words, the standard/regulation MUST be followed exactly as written. When used in a standard referenced here, the word is highlighted in **bold**.

Occupational safety and health regulators are responsible for ensuring the health and safety of workers across the country. When workplace safety dangers need to be addressed, they are the ones to take a closer look. There will almost certainly be an OSHA (or the equivalent state/local agency) investigation whenever there is a worker fatality, severe injury, or illness. They can and will issue civil fines for failure to comply with these standards. In addition, severe cases can be referred for prosecution. There is a common misbelief that government agencies cannot be fined. However, while uncommon, it has happened.

It should be noted that anyone can file a complaint with OSHA or the state/local equivalent. This could be someone attending a joint scene exam with you, a nosy neighbor, or an employee or coworker. There does not have to be an injury, etc., for an inspection or investigation to occur. Employers are prohibited from retaliating against an employee who files an OSHA complaint. The best way to prevent an inquiry is to comply with the standards.

Since the federal OSHA standards apply to most U.S. workers, this paper summarizes relevant standards affecting fire investigators. It is essential to understand that not every situation is covered by the OSHA standards, and some subjects that should be addressed are not. However, there is a catch-all standard that addresses this! Where no specific OSHA standard applies to a particular hazard, the General Duty Clause (OSH Act, Section 5) requires a workplace "free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees." This means that it is each fire investigator's responsibility to survey every post-fire scene regarding actual and potential hazards, assess the risk associated with any identified hazards, take any necessary

remedial actions to make the scene as safe as possible, and correctly use all required protective equipment and practices.

Many of the standards referenced herein have a training component. Appendix B is a matrix of the training requirements. OSHA document 2254-09R 2015 Training Requirements in OSHA Standards provides thorough coverage of this subject.

As fire investigators, our challenge is that the OSHA standards are designed for the traditional workplace environment, with readily identifiable hazards, not the vagaries and uniqueness of the post-fire workplace. However, the standards still apply, so we must do our best to fit them into our work environment and comply with them. The key to doing this is understanding the regulations and having training that addresses them.

Small Businesses

Certain small businesses may be exempt from some OSHA regulations based on size, business type, industry, and location. Companies that always employ ten or fewer persons during the previous calendar year do not need to keep OSHA injury and illness records unless OSHA or the Bureau of Labor Statistics informs them in writing that they must keep records under §1904.41 or §1904.42. However, as required by §1904.39, all employers covered by the OSH Act must report to OSHA any work-related incident that results in a fatality, the in-patient hospitalization of one or more employees, an employee amputation, or an employee loss of an eye. And while small businesses may be less likely to incur fines, there is no exemption from being fined!

As noted above, there are some states where the OSHA regulations are limited or may not apply, but state occupational safety regulations could apply. Additionally, if you are self-employed, the OSHA regulations do not apply to you. However, safe work practices should always be followed.

Other than these exemptions, the OSHA regulations apply to all U.S. small business employers and workers.

Employer Responsibilities

Among other requirements, all covered employers must:

- Show reasonable diligence in complying with the standards,
- Provide a workplace free from serious recognized hazards and comply with standards, rules, and regulations issued under the OSH Act,
- Examine workplace conditions to make sure they conform to applicable OSHA standards,
- Make sure employees have and use safe tools and equipment and properly maintain this equipment,
- Establish or update operating procedures and communicate them so that employees follow safety and health requirements and
- Provide medical examinations and training when required.

For a complete list, see https://www.osha.gov/workers/employer-responsibilities

The primary methodology for providing a workplace free from serious recognized hazards is using the hierarchy of controls. Initially introduced by the National Safety Council in 1950, this process is widely accepted and used to help provide a safe workplace. Unfortunately, in the post-fire environment, effective hazard mitigation is not always possible. "Due to the conditions that the investigator may encounter at the scene and the duration of the work, PPE may be the only control measure available." (NFPA 921, 2024 ed. §13.4.7.1.5).

Employers of specific North American Industry Classification System (NAICS) categories are not required to keep OSHA injury and illness records unless they are asked in writing to do so by OSHA, the Bureau of Labor Statistics (BLS), or a state agency operating under the authority of OSHA or the BLS. This includes NAICS category 5616 Investigation and Security Services. All employers, including those partially exempted by reason of company size or industry classification, must report to OSHA any workplace incident that results in a fatality, in-patient hospitalization, amputation, or loss of an eye (see 20 CFR 1904.39).

Employee Responsibilities

Employees also have responsibilities under the OSH Act. “Each employee **shall** comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to this Act which are applicable to his own actions and conduct.” (OSH Act, Section 5 Duties)

Personal Protective Equipment

Wearing an adequate and appropriate level of personal protective equipment (PPE) is an integral part of minimizing exposure to post-fire health hazards. The most important OSHA standards for fire investigators are those regarding PPE, and these are found in Subpart I (29 CFR 1910.132 - .138). These standards cover the respiratory protection requirements and protections for the head, hands, feet, and eyes, as well as hearing protection. Appendix B of 29 CFR 1910.132 provides compliance assistance for employers and employees in implementing requirements for a hazard assessment and selecting personal protective equipment. The current edition of the International Association of Arson Investigator's (IAAI) Fire Investigator Health and Safety Best Practices also provides excellent PPE assessment and selection information.

The introductory language in 29 CFR 1910.132(a) offers general guidance pertinent to fire investigators and their employers. "Protective equipment, including personal protective equipment for eyes, face, head, and extremities, protective clothing, respiratory devices, and protective shields and barriers, **shall** be provided, used, and maintained in a sanitary and reliable condition wherever it is necessary by reason of hazards of processes or environment, chemical hazards, radiological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact." Gas and particulate hazards that can

be inhaled or absorbed and cause injury or impairment are present at almost all post-fire scenes; therefore, fire investigators must be provided with and use PPE.

Proper PPE for most post-fire scenes

This section goes on to say that "the employer **shall** assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of personal protective equipment (PPE). If such hazards are present or will likely be present (based on several recent research projects, they ARE likely to be present in the post-fire environment), "the employer **shall** . . . select and have each affected employee use the types of PPE that will protect the affected employee from the hazards identified, communicate the decisions to each affected employee and select PPE that properly fits each affected employee" (29 CFR 1910.132(d)(1)).

Additionally, "[t]he employer **shall** verify that the required workplace hazard assessment has been performed through a written certification that identifies the workplace evaluated; the person certifying that the evaluation has been performed; the date(s) of the hazard assessment; and, which identifies the document as a certification of hazard assessment." (29 CFR 1910.132(d)(2)) I don't foresee employers doing this for each worksite as that would be very labor-intensive. However, a blanket policy statement regarding health hazards that are present at post-fire scenes and, therefore, require PPE use would likely be acceptable.

Training

The training component in the general PPE requirement standard requires the employer to provide training to each employee who is required to use this PPE that, at a minimum, covers when the PPE is necessary, what PPE is necessary, how to don, doff, adjust, and wear PPE properly; the limitations of the PPE; and the proper care, maintenance, useful life, and disposal of the PPE. Each employee must demonstrate an understanding of the training and their ability to use PPE properly before being allowed to perform work requiring the use of PPE (29 CFR 1910.132(f)(1) and (f)(2). There are retraining requirements under certain circumstances, but no annual retraining requirement for every employee.

Respiratory Protection

The most extensive standard in the PPE subpart is the one on respiratory protection (29 CFR 1910.134). My copy of this standard in 12-point font is twenty-seven pages long. There are also related appendices. Because of the amount of information on this subject, OSHA has prepared an overview document titled MAJOR REQUIREMENTS OF OSHA'S RESPIRATORY PROTECTION STANDARD 29 CFR 1910.134. I highly recommend that each employer and employee download and review this document and consult OSHA's Respiratory Protection web page.[1] The following summarizes this information.

[1] See https://www.osha.gov/respiratoryprotection/standards

OSHA requires employers to evaluate respiratory hazards in the workplace, identify relevant workplace and user factors, and base respirator selection on these factors. Then, they must provide employees with respirators that are "applicable and suitable" for the purpose intended "when such equipment is necessary to protect the health of the employee" (29 CFR 1910.134(a)(2)). Several recent fire investigator-focused research studies, including Horn, Madrzykowski, Neumann, Mayer, & Fent, 2021, have documented the hazardous levels of some gases in the post-fire environment for as long as three days after extinguishment and particulates until the scene has been thoroughly cleaned or no longer exists. This means that respiratory protection equipment is necessary for almost every post-fire scene exam. The employer must establish and implement a written respiratory protection program with worksite-specific procedures when this protection is needed. The program must be administered by a suitably trained program administrator who "is qualified by appropriate training or experience that is commensurate with the complexity of the program to administer or oversee the respiratory protection program and conduct the required evaluations of program effectiveness." There must also be a "competent decision-maker."[2] involved in PPE selection. The employer must conduct evaluations of the workplace as necessary to ensure proper implementation of the program, consult with employees to ensure appropriate use, and a written copy of the current program must be retained.

For workers in a non-IDLH atmosphere where gases and particulates are present (which is almost every post-fire scene), the standard lists multiple respirator requirements, but the employer must select a NIOSH-certified respirator. If employers follow the minimum respiratory protection guidelines listed in Appendix B of the current edition of the IAAI's Fire Investigator Health and Safety Best Practices, these requirements will be met. In addition, this standard specifically notes that anything less than an N-100, R-100, or P-100.[3] filter with a half-or full-facepiece air-purifying respirator (APR) or powered air-purifying respirator (PAPR) is not an acceptable level of respiratory protection against particulates. So, the only filter fire investigators should be using is P100. See 29 CFR 1910.134(d)(3)(iv) and 29 CFR 1910.134(d)(3)(iv)(B). A magenta color identifies these filters. You must then add a gas cartridge. For fire investigators, especially public investigators, this cartridge should, at a minimum, protect against oily vapors (OV), acid gases (AG), and formaldehyde (FM). These cartridges have an identifier that is olive in color. Because we know that hazardous levels of formaldehyde dissipate after about three

[2] OSHA more recently uses the term competent person. They define this as "[o]ne who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them." A competent person needs both knowledge and authority.

[3] N means not oil-resistant, R means oil-resistant, and P means highly oil-resistant. If oil particles (e.g., lubricants, solvents, glycerin, etc.) are present, and they likely are in the post-fire environment, and the filter is to be used more than once, then a P series respirator must be used per 42 CFR 84. A 100-rated filter is a high-efficiency particulate air (HEPA) filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers (aka microns) in diameter. The only thing better for us is SCBA.

days, private fire investigators at scenes after this time could use a gas filter without formaldehyde protection (yellow color). These identifying colors are a NIOSH standard.

Medical Examination

The employer must provide a medical evaluation to determine the employee's physical ability to use a respirator before any fit test and respirator use. This evaluation must be done by a physician or other licensed healthcare professional (PLHCP) using the OSHA medical questionnaire or an initial medical examination that obtains the same information as the medical questionnaire. The approved questionnaire is included in Appendix C of 29 CFR 1910.134. In addition, the PLHCP must provide a written recommendation regarding the employee's ability to use the respirator. Although an annual review of employees' medical status is not required, there are some instances where additional medical evaluations are required. Consult the standard for further information and record retention requirements.

Fit Testing

Every employee using a facepiece of the type necessary for conducting fire investigations must pass a qualitative or quantitative fit test before initial use, whenever a different respirator facepiece is used, and at least annually after that. The specific fit test protocols are detailed in the standard and the above-referenced summary document. A record of all fit tests must be established and retained until the next fit test. If you have multiple respirators, each one must be tested.

Respirator Use

Tight-fitting respirators (which we should be using) "**shall** not be worn by employees who have facial hair or any condition that interferes with the face-to-facepiece seal or valve function." "Personal protective equipment **shall** be worn in such a manner that it does not interfere with the seal of the facepiece on the user's face." "Employees **shall** perform a user seal check (used to be called a fit check) each time they put on a tight-fitting respirator" using the procedures in the mandatory 29 CFR 1910.134 Appendix B-1 or equally effective manufacturer's guidelines to ensure a tight seal before entering any potentially contaminated area, also known as the scene's warm and hot zones.

Maintenance and Care

Employees using respirators must clean and disinfect them using the procedures in 29 CFR 1910.134 Appendix B-2 or the equally effective manufacturer's guidelines as often as necessary to maintain sanitary conditions for the exclusive use of respirators. This is typically done using warm, slightly soapy water. Alcohol wipes should not be used because they can degrade the facepiece material over time. There are additional requirements for respirators when used by multiple people during fit testing. It's best to store your respirator when not in use in an airtight container after cleaning.

Training

Unless another employer has provided acceptable training within the preceding twelve months before initial use, employers must provide training to employees using respirators that includes why the respirator is necessary and how improper fit, use, or maintenance can compromise the protective effect of the respirator; the limitations and capabilities of the respirator; their use in emergencies; how to inspect, put on and remove, use and check the seals; procedures for maintenance and storage; recognition of medical signs and symptoms that may limit or prevent effective use; and the general requirements of this standard. In addition, annual retraining is required, and whenever workplace conditions change, new types of respirators are used, or inadequacies in the employee's knowledge or use indicate the need.

Hand Protection

"Employers **shall** select and require employees to use appropriate hand protection when employees' hands are exposed to hazards such as those from skin absorption of harmful substances; severe cuts or lacerations; severe abrasions; punctures; chemical burns; thermal burns; and harmful temperature extremes. Employers **shall** base the selection of the appropriate hand protection on an evaluation of the performance characteristics of the hand protection relative to the task(s) to be performed, conditions present, duration of use, and the hazards and potential hazards identified." (29 CFR 1910.138) These conditions are present at almost every post-fire scene.

Eyes and Face Protection

"The employer **shall** ensure that each affected employee uses appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation." The protective eye and face protection devices must comply with any of the consensus standards listed in the standard (29 CFR 1910.133). Particulates are a known health hazard present at almost all post-fire scenes, so this protection is necessary. Goggles need to be worn with half-facepiece APRs to protect the eyes and reduce the likelihood of absorption through the ocular mucus membrane. Using a full facepiece respirator would also satisfy this requirement.

Foot Protection

"The employer **shall** ensure that each affected employee uses protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, or when the use of protective footwear will protect the affected employee from an electrical hazard, such as a static-discharge or electric-shock hazard, that remains after the employer takes other necessary protective measures." The protective footwear must comply with one of the listed consensus standards. (29 CFR 1910.136) These conditions are present at almost every post-fire scene.

Head Protection

"The employer **shall** ensure that each affected employee wears a protective helmet when working in areas where there is a potential for injury to the head from falling objects. In addition, the employer **shall** ensure that a protective helmet designed to reduce electrical shock hazard is worn by each such affected employee when near exposed electrical conductors which could contact the head." The protective helmet must comply with any of the consensus standards listed in the standard or show that it is at least as effective as head protection devices constructed according to one of the consensus standards (29 CFR 1910.135).

This standard only addresses falling objects, in which case an approved hard hat would meet the requirement when no electricity is involved. However, a fire investigator's work is often more complex. Head protection includes a chin strap that protects from ladder falls, slips, and trips. 29 CFR 1910.22 says that walking-working surfaces are to be hazard-free. It's challenging to do this at a fire scene! Without a secured chin strap, if the investigator falls, the headgear may land before they do, providing no protection.

Other Possible Fire Scene Hazards

Asbestos

If a fire investigator believes a structure may contain asbestos, which includes most structures built before 1980 but may include newer structures, appropriate testing should be conducted pursuant to 29 CFR 1910.1001, and all remediation completed before any fire investigation activities start. The asbestos standard applies to all occupational exposures to asbestos in all industries. This necessarily includes fire investigators if they could be exposed to an asbestos environment by entering before an asbestos identification is made or unknowingly working in an asbestos environment.

There are asbestos-specific PPE requirements listed in this standard that must be complied with whenever an employee is working in this environment, which could be at any time for a fire investigator who is on a scene before or absent an asbestos determination. Employers must provide, and employees must use, respiratory protection (see the requirements above), coveralls or similar full-body work clothing, gloves, head coverings, foot coverings, face shields, vented goggles, or other appropriate protective equipment that complies with the eyes and face protection listed above. Of course, this is what should be worn regardless!

The standard identifies two permissible exposure limits (PEL): the time-weighted average limit (TWA)[4] and the excursion limit.[5]

Training. For employees who may be exposed to asbestos at or above either PEL, the required training **shall** be provided before or at the time of the initial assignment and at least annually after that. The standard lists the required training subjects, including the purpose, proper use, and limitations of respirators and protective clothing.

Bloodborne Pathogens

OSHA defines a bloodborne pathogen occupational exposure as "reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties." Most post-fire scenes do not have these exposures, but they can occur, especially at fatal fire scenes. Engineering and work practice controls **shall** be used to eliminate or minimize employee exposure: "[w]here occupational exposure remains after institution of these controls, personal protective equipment shall also be used" (29 CFR 1910.1030(d)(2)(i). Even if adequate PPE is used, when there is a suspected or known bloodborne pathogen exposure, the employee **shall** clean their hands and other skin areas as soon as practical with soap and water or antiseptic cleaner. 29 CFR 1910.1030 also addresses exposure control, documentation, and management of bloodborne pathogens.

Training. Training **shall** be "provided at the time of initial assignment to tasks where occupational exposure may take place." "Annual training for all employees **shall** be provided within one year of their previous training." See 29 CFR 1910.1030(g)(2) for complete information.

Formaldehyde

As noted, the OSHA regulations are designed for the traditional workplace, and that is not the environment we work in. However, to comply with the regulations, we need to adapt them to our work environment as best we can. For example, hazardous formaldehyde levels have been documented in recent studies for several hours after suppression and overhaul have ended. They can remain as long as three days in the post-fire environment in some instances. Formaldehyde molecules can also be trapped in the fire debris and released later when the scene is dug out, and they can be attached to the particulates floating in the air. Since testing for formaldehyde is not easily done, based on this recent

[4] "Time-weighted average limit (TWA). The employer **shall** ensure that no employee is exposed to an airborne concentration of asbestos in excess of 0.1 fiber per cubic centimeter of air as an eight (8)-hour time-weighted average (TWA) as determined by the method prescribed in Appendix A to this section or by an equivalent method." (29 CFR 1910.1001(c)(1))

[5] "Excursion limit. The employer **shall** ensure that no employee is exposed to an airborne concentration of asbestos in excess of 1.0 fiber per cubic centimeter of air (1 f/cc) as averaged over a sampling period of thirty (30) minutes as determined by the method prescribed in Appendix A to this section, or by an equivalent method." (29 CFR 1910.1001(c)(2))

research, we should assume it is present in every hot and warm scene.[6] This is of particular importance to public fire investigators.

The OSHA formaldehyde standard (29 CFR 1910.1048) applies to all occupational exposures to formaldehyde. This standard also identifies an action level of a concentration of 0.5 parts formaldehyde per million parts of air (0.5 ppm) calculated as an eight (8)-hour time-weighted average (TWA) concentration. This is small, but measuring it is only practical in some post-fire environments, so we need to rely on other data and related research.

The employer must implement a respiratory protection program in accordance with 29 CFR 1910.134(b) through (d) (except (d)(1)(iii), (d)(3)(iii)(b)(1), and (2)), and (f) through (m), which covers each employee required by this section to use a respirator. (29 CFR 1910.1048(g)(2)(i)).

This standard requires employers and employees to comply with the respiratory protection requirements addressed above (29 CFR 1910.134), an easy task since we have already determined that the conditions of the post-fire scene require this respiratory protection. In addition, the employer needs to ensure that the gas cartridge includes formaldehyde protection (olive identifying color). There is a further requirement to use an air-purifying, half-mask respirator with the appropriate filter/cartridge combination, which consists of the addition of effective gas-proof goggles. Alternatively, the employee can wear a full facepiece respirator with the appropriate filter/cartridge combination or SCBA. Finally, employers and employees must comply with the above general PPE requirements (29 CFR 1910.132) and the above eye and face protection (29 CFR 1910.133).

It is interesting to note that this standard requires the employer to "assure that no employee takes home equipment or clothing that is contaminated with formaldehyde." It is fair to say that clothing worn by fire investigators, especially public fire investigators, because of the timeframe in which they are typically conducting their scene exam, may be formaldehyde contaminated if they have spent any time in the scene's hot zone.

Additionally, the employer shall inform anyone who launders, cleans, or repairs such clothing or equipment of formaldehyde's potentially harmful effects and procedures to handle the clothing and equipment safely. This is certainly an interesting statement. There are also packaging and labeling requirements regarding the storage and cleaning of contaminated apparel. See 29 CFR 1910.1048(h)(2) Maintenance of protective equipment and clothing for additional information.

"The employer **shall** make medical surveillance available for employees who develop signs and symptoms of overexposure to formaldehyde and for all employees exposed to

[6] These are defined in the current edition of the IAAI Fire Investigator Health and Safety Best Practices document, which is available to all at www.iaaiwhitepaper.com

formaldehyde[7] in emergencies. When determining whether an employee may be experiencing signs and symptoms of possible overexposure to formaldehyde, the employer may rely on the evidence that signs and symptoms associated with formaldehyde exposure will occur only in exceptional circumstances when airborne exposure is less than 0.1 ppm and when formaldehyde is present in the material in concentrations less than 0.1 percent." For this standard, "emergency is any occurrence, such as but not limited to equipment failure, rupture of containers, or failure of control equipment that results in an uncontrolled release of a "significant amount of formaldehyde." These are typically situations not encountered in a post-fire scene examination; however, it is possible to develop overexposure symptoms.

Training. The formaldehyde standard also requires initial and annual training for all employees who may be exposed to formaldehyde. The training program "shall be conducted in a manner that the employee can understand and shall include a discussion of the contents of this regulation. The purpose for and a description of the medical surveillance program required by this standard, including a description of the potential health hazards associated with exposure to formaldehyde and a description of the signs and symptoms of exposure to formaldehyde; instructions to immediately report to the employer the development of any adverse signs or symptoms that the employee suspects are attributable to formaldehyde exposure; description of operations in the work area where formaldehyde is present and an explanation of the safe work practices appropriate for limiting exposure to formaldehyde; and the purpose for, proper use of, and limitations of personal protective clothing and equipment." In addition, this standard includes other training requirements that typically would not apply to fire investigators. See 29 CFR 1910.1048(n) Employee information and training for additional information.

Lead

Another toxic substance that can be found in fire smoke and the post-fire environment is a component of particulate matter is lead. Due to the complexities of the composition of post-fire particulate matter, it is impossible in most circumstances to determine whether lead is present; however, given the many household and building construction items that contain lead, it can be assumed that there is likely a lead component to these particulates and therefore a potential exposure hazard for employees, which would trigger the below training requirement. There are additional requirements when exposures are above the permissible exposure limit, which is not easily determined at a post-fire scene. As with the formaldehyde standard, there are PPE and medical surveillance requirements here for certain exposure circumstances. See 29 CFR 1910.1025 and its appendices for additional information.

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[7] Overexposure to formaldehyde irritates the eyes, nose, throat, and skin. Formaldehyde can cause allergic reactions of the skin (dermatitis) and the lungs (asthma). Formaldehyde is a known cause of cancer in humans.
https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/OHB/HESIS/CDPH%20Document%20Library/formaldehy de.pdf

Training. Each employer who has a workplace in which there is potential exposure to airborne lead at any level shall inform employees of the content of Appendices A and B of this regulation. The employer shall train each employee who is subject to exposure to lead at or above the action level or for whom the possibility of skin or eye irritation exists, per the requirements of this section. This training program must inform these employees of the specific hazards associated with their work environment, protective measures that can be taken, the danger of lead to their bodies (including their reproductive systems), and their rights under the standard. The employer shall institute a training program and ensure employee participation in the program. The employer shall provide initial training for those employees before the time of initial job assignment. The training program shall be repeated at least annually for each employee. The employer shall make a copy of the standard and its appendices available to all employees.

Other Relevant Training and Procedural Requirements

Medical

"In the absence of an infirmary, clinic, or hospital in near proximity to the workplace which is used for the treatment of all injured employees, a person or persons shall be adequately trained to render first aid. Adequate first aid supplies shall be readily available" (29 CFR 1910.151).

For public fire investigators, this is easily accomplished in most instances through EMT training or having their EMS services nearby or readily available. However, this training requirement and equipment are essential for private fire investigators, especially when working alone.

HAZWOPER

The hazardous waste operations and emergency response (HAZWOPER) standard (29 CFR 1910.120) is very long and detailed. The beginning of the standard lists the scope of activities covered, and the first four apply to sites that fire investigators are typically not involved with. However, the last covered operation says, "emergency response operations for releases of, or substantial threats of releases of, hazardous substances without regard to the location of the hazard." Public fire investigators could become involved with a scene of this type, in which case this standard would apply. For private fire investigators, if the emergency has ceased and if any government-required clean-up operations have started, they should not enter the scene before ensuring that compliance with any part of this standard has been met.

Supervisors/managers must understand the definition of this type of scene because any activities associated with work at these scenes require special training. "Employees shall not be permitted to participate in or supervise field activities until they have been trained to a level required by their job function and responsibility." This means that every applicable fire investigator must be adequately trained before an incident occurs to safely carry out

their duties based on their level of participation. At a minimum, this means training as a hazmat technician. The employer is required to document and certify each employee's level of training.

Miscellaneous Related Topics

Employers and fire investigators must be aware of other required training subjects in addition to the above. The document Training Requirements in OSHA Standards (OSHA 2254-09R 2015) covers these requirements in greater detail, and readers are encouraged to review it along with each applicable standard. In addition, while every attempt has been made to include here all OSHA-required training relevant to fire investigators and others working at post-fire scenes, there could be other OSHA training requirements that are not listed here.

Confined Space

Any activities associated with working in permit-required confined spaces require specialized training. For further information, see 29 CFR 1910.146. There is no reason for a fire investigator to enter a permit-required confined space!

Electrical Hazards

"Employees who may reasonably be expected to face comparable risk of injury due to electric shock or other electrical hazards must be trained. The training requirements contained in this section apply to employees who face a risk of electric shock that is not reduced to a safe level by the electrical installation requirements of 29 CFR 1910.303 through .308." See 29 CFR 1910.332 for the training requirements.

Fall Protection Systems and Falling Object Protection

29 CFR 1910.26 addresses a variety of situations regarding these subjects. While there may be some instances where compliance with these regulations would be necessary at a post-fire scene, a better practice would be to conduct a thorough hazard/risk analysis and eliminate any identified hazards. This would also likely eliminate the need for the required training (29 CFR 1910.30) associated with this subject.

Hand and Portable Powered Tools and Equipment

"Each employer shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which employees may furnish" (29 CFR 1910.242). Additionally, 29 CFR 1910.243 explicitly covers the guarding of portable powered tools.

Ladders

"The employer must ensure that each ladder used meets the requirements of this section" (29 CFR 1910.23). "Ladders are to be inspected before initial use, and more frequently as necessary, to identify any visible defects that could cause employee injury and not used and taken out of service if defects are identified. Ladders are to be used only on stable and

level surfaces unless they are secured or stabilized to prevent accidental displacement. Portable ladders used on slippery surfaces are secured and stabilized. Portable ladders used to gain access to an upper landing surface have side rails that extend at least 3 feet (0.9 m) above the upper landing surface." Based on the above language in 29 CFR 1910.242, it is reasonable to assume that the employer is also responsible for the safe condition and use of ladders.

Noise

When employees are subjected to excessive levels of sound, "feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels of Table G-16, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table" (29 CFR 1910.95). This can be a somewhat complex calculation based on factors including Db level and exposure time, which can be challenging at most post-fire scenes.

Portable Fire Extinguishers

"Where an employer has provided portable fire extinguishers for employee use in the workplace, the employer shall also provide an educational program to familiarize employees with the general principles of fire extinguisher use and the hazards involved with incipient stage firefighting. The employer shall provide the education required in this section upon initial employment and at least annually thereafter." See 29 CFR 1910.157 for further information. In addition, if an employer provides a fire extinguisher in their agency/company vehicle(s) used by fire investigators, this regulation will apply. Public fire investigators may have received this training as part of their initial firefighter training but may not get the annual retraining. Private fire investigators may have never had this training.

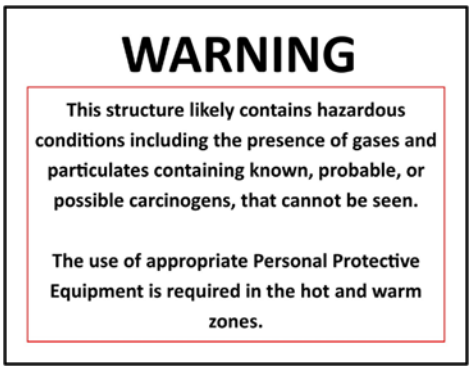
Safety Color Codes for Marking Physical Hazards

Whenever a hazard cannot be eliminated, it must be identified. While this may not occur often, and when a fire investigator is at a scene by themselves, it would seem unnecessary, there could be times when it is necessary to mark physical hazards at a post-fire scene, in which case OSHA regulation 1910.144 is applicable. "Red lights shall be provided at barricades and temporary obstructions. Danger signs shall be painted red." "Yellow shall be the basic color for designating caution and for marking physical hazards such as striking against, stumbling, falling, tripping, and 'caught in between' hazards."

Lockout/Tagout

If other standards require the use of lockout or tagout procedures or lockout/tagout procedures are to be used as part of a fire investigation, documented energy control procedures must be developed, and employee training is required before conducting those activities. See 29 CFR 1910.147 for further information.

Accident Prevention Tags



OSHA requires specific signs to be posted when it is necessary to identify hazardous or potentially hazardous conditions, including illness or injury, "which are out of the ordinary, unexpected or not readily apparent." For temporary situations, these notices are to be posted near hazards (entrance points) and must contain an approved signal word and message indicating the specific hazardous condition or instruction. There are four approved signal words: Danger, Caution, Warning, and Biological. Typically, a warning is most appropriate for health hazards in a post-fire scene. All workers shall be informed as to the meaning of the tags (signs) used and what special precautions are necessary. This would be part of the safety briefing(s).

Most post-fire scenes contain health hazards that are not readily apparent, meaning that signs need to be posted. (See 29 CFR 1910.145 (f) for full information.) The example shown above should include the name of the issuing agency and a phone number.

Ladders

The employer must ensure that each ladder used meets the requirements of this section. This section covers all ladders, except when they are used in emergency operations such as firefighting, rescue, and tactical law enforcement operations, or training for these operations, or designed into or are an integral part of machines or equipment. Ladders are to be inspected before initial use in each work shift and more frequently as necessary to identify any visible defects that could cause employee injury and removed from service if such are found. Ladders are used only on stable and level surfaces unless they are secured or stabilized to prevent accidental displacement. (29 CFR 1910.23)

Walking-Working Surfaces

Walking-working surfaces are to be maintained free of hazards such as sharp or protruding objects, loose boards, corrosion, leaks, spills, snow, and ice. Hazardous conditions on walking-working surfaces **shall** be corrected or repaired before an employee uses the walking-working surface again. If the correction or repair cannot be made immediately, the hazard must be guarded to prevent employees from using the walking-working surface until the hazard is corrected. (29 CFR 1910.22)

Powered Platforms, Manlifts, and Vehicle-Mounted Work Platforms

Only trained persons **shall** operate an aerial lift of any type. A personal fall arrest or travel restraint system that meets the requirements in subpart I of this part shall be worn and attached to the boom or basket when working from an aerial lift. (29 CFR 1910.67)

Hand and Portable Powered Tools and Other Hand-Held Equipment

Each employer **shall** be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees.

Compressed air used for cleaning. Compressed air shall not be used for cleaning purposes except where reduced to less than 30 p.s.i. and then only with effective chip guarding and personal protective equipment. (29 CFR 1910.242)

Hazard Communications

While this standard typically applies to workers in a more structured environment with identifiable and quantifiable hazards, it is possible that, in certain circumstances, the requirements here could apply to a post-fire scene. For example, this standard (29 CFR 1910.1200) says, "Employers **shall** provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new chemical hazard the employees have not previously been trained about is introduced into their work area." If this applies to a specific post-fire scene, please consult the entire standard for further information.

Training Records

Employers must keep accurate and complete records of the training they provide to their employees. At a minimum, this should include:

- Course syllabus
- Attendee list
- The test itself and the scores for each attendee
- All student feedback forms/information
- Instructor bios with credentials

These records should be retained pursuant to the employer's document retention schedule.

Appendix A – State Coverage Breakdown

Federal OSHA States	OSHA State Plans: Include Private, State, and Local Gov't. Workers	Hybrid Federal-State Plans: Cover State/Local Government Only
Alabama	Alaska	Connecticut
American Samoa	Arizona	Illinois
Arkansas	California	Maine
Colorado	Hawaii	Massachusetts
Delaware	Indiana	New Jersey
District of Columbia	Iowa	New York
Florida	Kentucky	Virgin Islands
Georgia	Maryland	
Guam	Michigan	
Idaho	Minnesota	
Kansas	Nevada	
Louisiana	New Mexico	
Mississippi	North Carolina	
Missouri	Oregon	
Montana	Puerto Rico	
Nebraska	South Carolina	
New Hampshire	Tennessee	
North Dakota	Utah	
Northern Mariana Islands	Vermont	
Ohio	Virginia	
Oklahoma	Washington	
Pennsylvania	Wyoming	
Rhode Island		
South Dakota		
Texas		
West Virginia		
Wisconsin		

This chart is correct as of the date this document was published.

Appendix B – OSHA Training Requirement Matrix

OSHA Training Requirements

Subject	Initial Training Required	Annual Retraining Required	Other Information
Asbestos	Y	Y	
Bloodborne Pathogen	Y	Y	
Eye and Face Protection	N	N	
Foot Protection	N	N	
Formaldehyde	Y	Y	
Hand Protection	N	N	
Head Protection	N	N	
Lead	Y	Y	
PPE - General	Y	N	Retraining in certain circumstances
Respiratory Protection	Y	Y	Additional training in some circumstances

NOTE: Some other subject areas require specialized training that is not listed here.

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About the Author

An internationally recognized expert on fire service health and safety, Jeff Pauley is a senior partner and Fire Division manager at Pacific Pointe Consulting, Inc. in Summerfield, NC, where they provide training, support, and policy development assistance regarding the fire and post-fire environment.

After a twenty-three-year career in law enforcement, Jeff was recruited to become a fire investigator. He served as a deputy fire marshal for the Bedford County (Virginia) Department of Fire & Rescue for five years and as the battalion chief/fire marshal there for two and a half years. He then spent over four years as a fire investigator with EFI Global, Inc. in North Carolina. Jeff also spent many years as a volunteer firefighter. Now retired from the active fire service, he shares his passion for fire service health and safety by consulting, teaching, writing, and researching. He is the lead developer and primary instructor of the Fire Investigation Safety Officer course.

Jeff has been a member of the International Association of Arson Investigators' Health & Safety Committee since its establishment in 2016 and served as its chairman from April 2018 to January 2024. He was the lead author of the committee's first three groundbreaking editions of Fire Investigator Health and Safety Best Practices. He is on the Oversight and Planning Board of the federally funded Fire Fighter Cancer Cohort Study, serves on the advisory boards of the University of Miami's Firefighter Cancer Initiative and the North Carolina Fire Fighter Cancer Cohort Study, and is a member of the US Fire Administrator's Fire Fighter Cancer workgroup. Jeff has been and is a technical advisor for several post-fire health-related research projects and served on the task group that completely revised the safety chapter for the 2024 edition of NFPA 921 Guide for Fire and Explosion Investigations. Jeff has written numerous published articles and has given many presentations on fire service health and safety.

Jeff holds the IAAI's certified fire investigator designation. He is a member of the IAAI's North Carolina chapter, the Institution of Fire Engineers, the International Society for Respiratory Protection, the Fire Department Safety Officers Association, and the American Society of Safety Professionals. To complement his many years of public safety experience, Jeff has an associate degree in law enforcement and a bachelor's degree in management studies from the University of Maryland, a graduate certificate in public administration from Southern New Hampshire University, and a master's degree in occupational safety and health from Columbia Southern University.